

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

ENGINEERING

37

FACT FILES ON:

- ▶ Dam-building
- ▶ Factories in Space
- ▶ Lean-burn car engines
- ▶ Micromachines
- ▶ Military engineering
- ▶ Land reclamation
- ▶ Stemming the sea

GIANT POSTER:

JAPAN'S REVOLUTIONARY
BRIDGING SYSTEM

MAKE A JET CAR

TEST AN ENGINEERING PRINCIPLE

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INSIDE THIS PACK

FACT FILES

- Catalytic converters
- Root systems
- Portable bridges
- Designing software
- Polders ► Boosting engine performance
- Nanotechnology
- Sea defences



MODEL Jet car



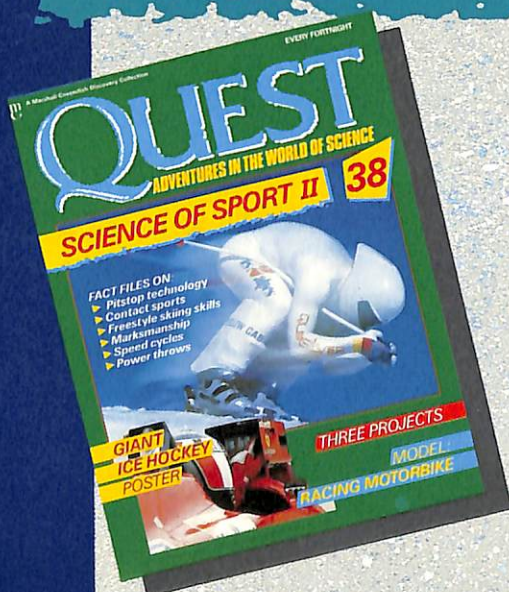
POSTER

The Kojima-Sakaide bridge route

THREE SCIENTIFIC PROJECTS



IN QUEST 38 SCIENCE OF SPORT II



FACT FILES INCLUDE:

- Racing cycles
- In the pits
- Target shooting
- Pole-vaulting
- Downhill racers
- Training and tactics



MODEL

Kawasaki ZXR7 racer



POSTER

Gladiators on ice

ISSN 1350-3766





MODEL

ASSEMBLY INSTRUCTIONS

1 2 3 4 5

JET CAR

You will need

Scissors • Ruler • Craft knife • Glue • Thin dowling or two cocktail sticks

Before cutting out the pieces, score along all broken lines with a blunt edge and ruler to make folding and gluing easier. Study the ASSEMBLY DIAGRAM to see how the pieces fit together, and use the dotted lines as a guide for positioning. Make small holes at the centre of all crosses by piercing the crosses with a craft knife.

NB Younger children will need supervision when using a craft knife.

To make up

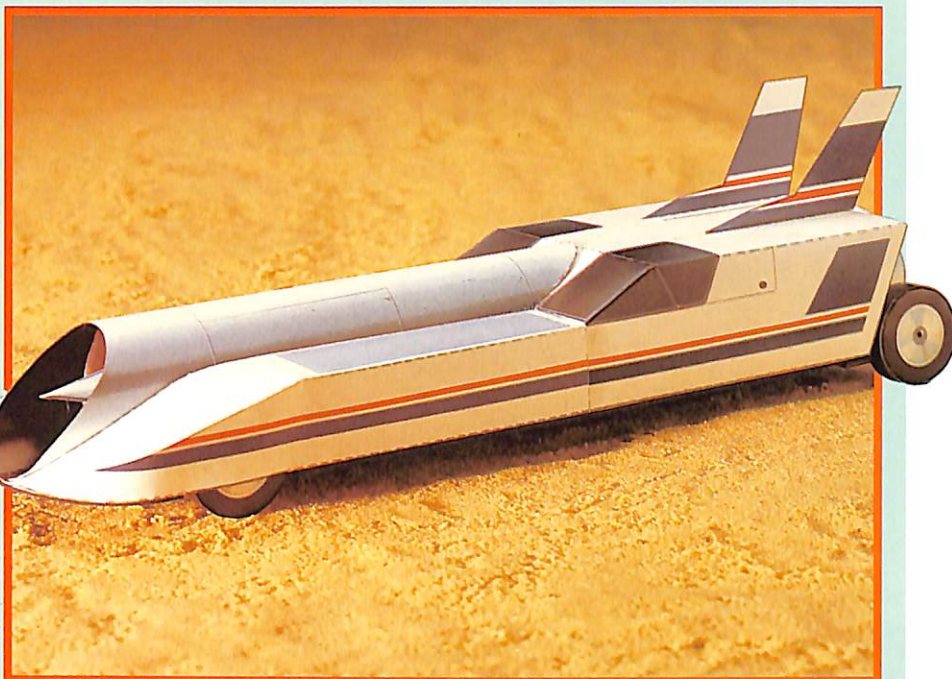
Car body

1 Cut out underside **A** and body part **B**. Fold down tabs on **B**, fold to shape and then glue tabs into position (see ASSEMBLY DIAGRAM). Glue tabs on base of **B** to top side of **A**, following positioning dots.

2 Cut out jet engine cover **C**, make holes at centre of two crosses, and glue into tube shape. Fold down tabs and then glue them to front end of **B**, so that tube runs down centre of **A** (see ASSEMBLY DIAGRAM).

Wheels

1 Cut out wheel parts **H**, **J** and **I**. Using craft knife, pierce hole at centre of cross on all eight parts **H** and **I**.



2 Fold down tabs on **H**, spread glue on tabs, then wrap **J** around **H**. Stick other side of wheel **I** to folded-down tabs on **J**. Repeat to make up other three wheels.

3 Trim dowling or cocktail stick down to 65 cm. Push stick through cross on one side of **C** and then through cross on other

side of **C**. Skewer end of stick through hole in side **I** of wheel, pushing stick until it emerges a little through **H** side of wheel. Repeat to attach other front wheel.

4 Cut out body part **D**, fold to shape and glue tabs to **A**, **B** and **C**. Repeat with body part **E**.

Rear of car

1 Cut out rear chassis **F**, fold down tabs and glue each tab into tube shape (see ASSEMBLY DIAGRAM). Cut out two parts marked **G** and glue to underside of **F**, following positioning marks. Glue **F** into position on **A**.

2 Cut out rear end **K** and form into tube shape. Then glue **K** to end of **B**.

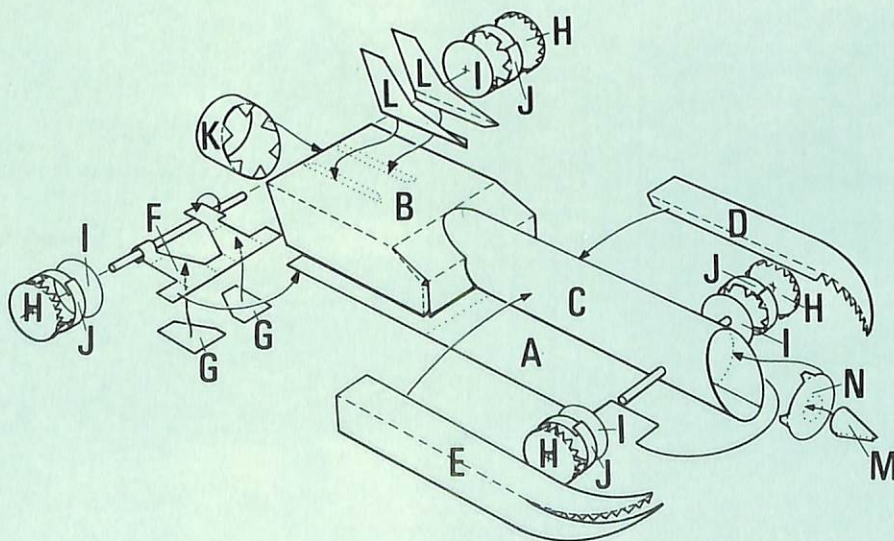
3 Trim dowling or cocktail stick to 70 cm. Thread stick through tubes on **F**. Skewer one end of stick into **I** side of wheel and very slightly through **H** side. Repeat with other rear wheel.

To finish

1 Cut out tail fins, both marked **L**. Fold tabs and glue to top of **B**, following positioning dots.

2 Cut out tip of jet engine **M**, form into cone and fold down tabs. Cut out engine cover **N** and glue **M** to dotted circle on **N**.

3 Spread glue over tabs on **N** and stick into open end of **C**.





PROJECTS

ENGINEERING

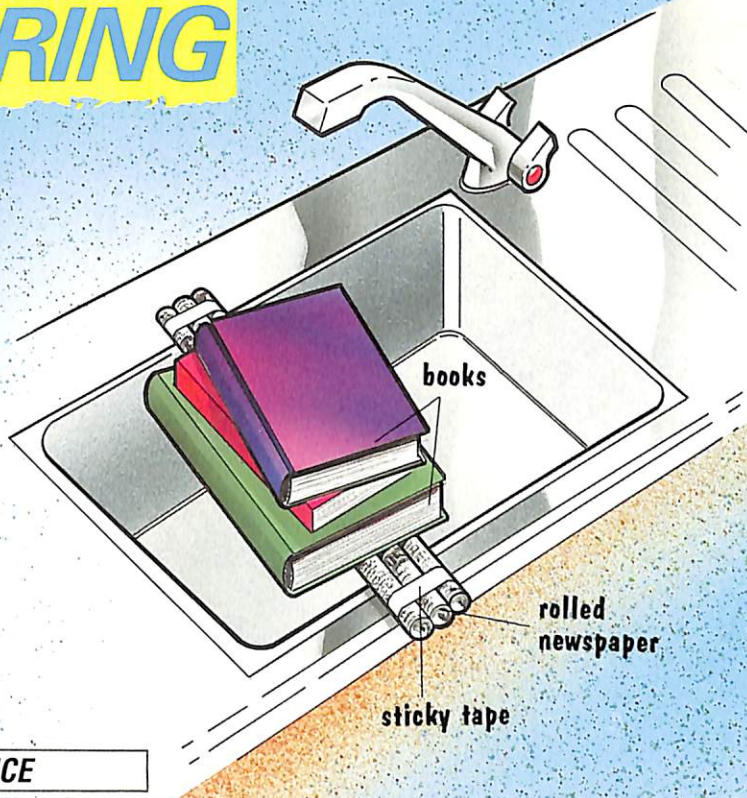
How can three sheets of newspaper support a pile of books?

PAPER ENGINEERING



Three sheets of newspaper can gain considerable strength when the principles of engineering are employed.

All you need are three sheets of newspaper, some sticky tape and a couple of heavy books. If you lay the three sheets of paper over a kitchen sink and place one of the books in the centre, the paper will simply collapse into the sink. Now take each of the sheets in turn, roll them into a tight cylinder and secure them with the tape. Lay the cylinders on a flat surface and secure them together with the tape. Now lay the cylinders over the sink once more and place both of the books in the centre. You will find that the paper can now support the weight. This is because the cylinder distributes any load placed on it.

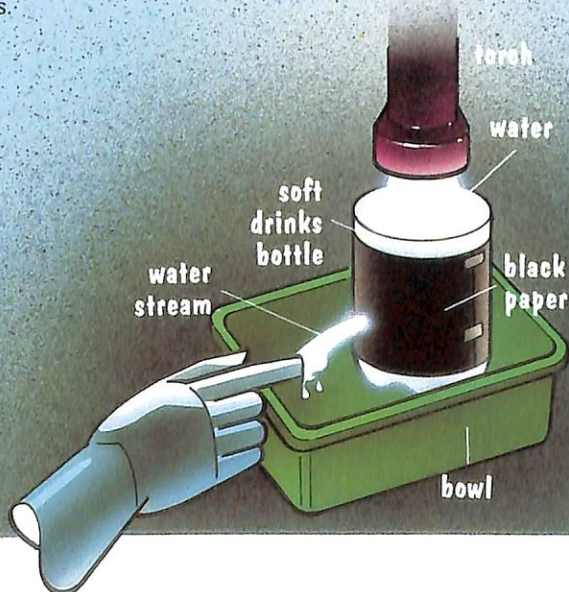


ADVENTURES IN THE WORLD OF SCIENCE

MAKE A FIBRE OPTIC



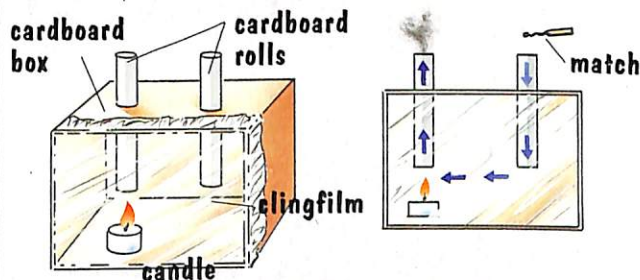
You will need a plastic soft drinks bottle, a plastic bowl, a sheet of black paper and a torch. Cut the bottle in half and wrap the black card around it, securing it with sticky tape. Make a large hole with a screwdriver near the bottom of the bottle, then place it in the bowl. Now draw the curtains and make the room as dark as possible. Fill the bottle with water and shine the torch into the bottle. As the water flows out of the hole, light will follow it. Put your finger in the stream and watch the light on it. The water is in fact an optical fibre, behaving in exactly the same way as a strand of glass.



VENTILATE A MINE



You will need a cardboard box, a sheet of card, cling film, a small section of candle and matches. Make two 2 x 30 cm tubes of card. Cut two round holes in the side of the box and insert the two tubes in them as shown. Place the candle beneath one of the tubes and light it. Quickly secure the cling film over the bottom of the box and hold a newly blown out match over the second tube. The smoke will be sucked down the second tube and up the first, driven by the heat of the candle. (Now blow the candle out.) This is how old mines were ventilated.



PROJECT INFORMATION



WARNING!

Each QUEST project and model has its own difficulty rating: 1 very simple, 2 simple, 3 intermediate, 4 advanced, 5 complicated. Every care has been taken to ensure projects are as safe as possible. However, parents should supervise all projects. The publisher can accept no liability for injury.

BRIDGING THE ISLANDS

JAPAN'S GIGANTIC HONSHU-SHIKOKU BRIDGE PROJECT

OVER TROUBLED WATER

An earthquake zone containing sea often swept by treacherous currents and whipped by typhoon winds – this is the improbable site for one of the most ambitious engineering feats of the 20th century, Japan's Honshu-Shikoku Bridge Project. The task involves building three massive road and rail links from the island of Shikoku across the Seto Inland Sea to Honshu. Each route comprises a series of bridges that use the Seto Sea's tiny islands as 'stepping stones'. The entire project should be completed by the end of this century, at a cost of many trillions of yen.

A 'spaghetti junction' of access and exit roads leads to and from a viaduct section of the Seto Ohashi bridge. The upper level is a four-lane highway, underneath run railway lines.





A DREAM COMES TRUE

When completed, the three routes will link Shikoku with the mainland — an idea first dreamt of at least 100 years ago.

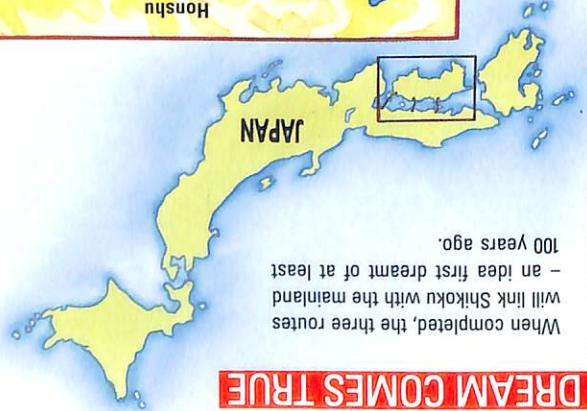
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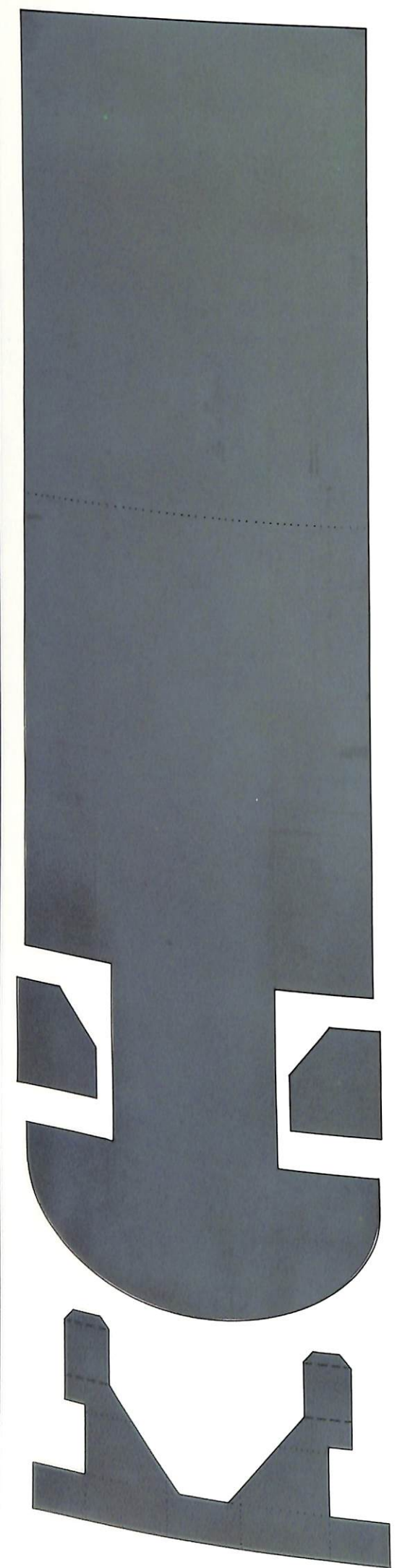
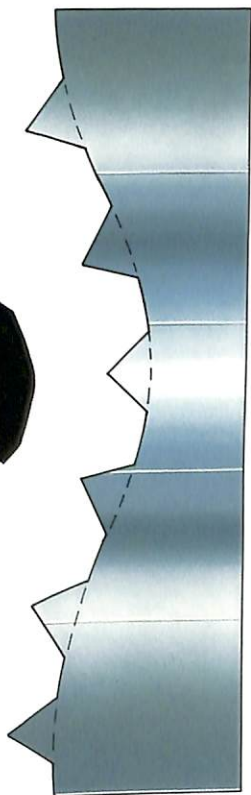
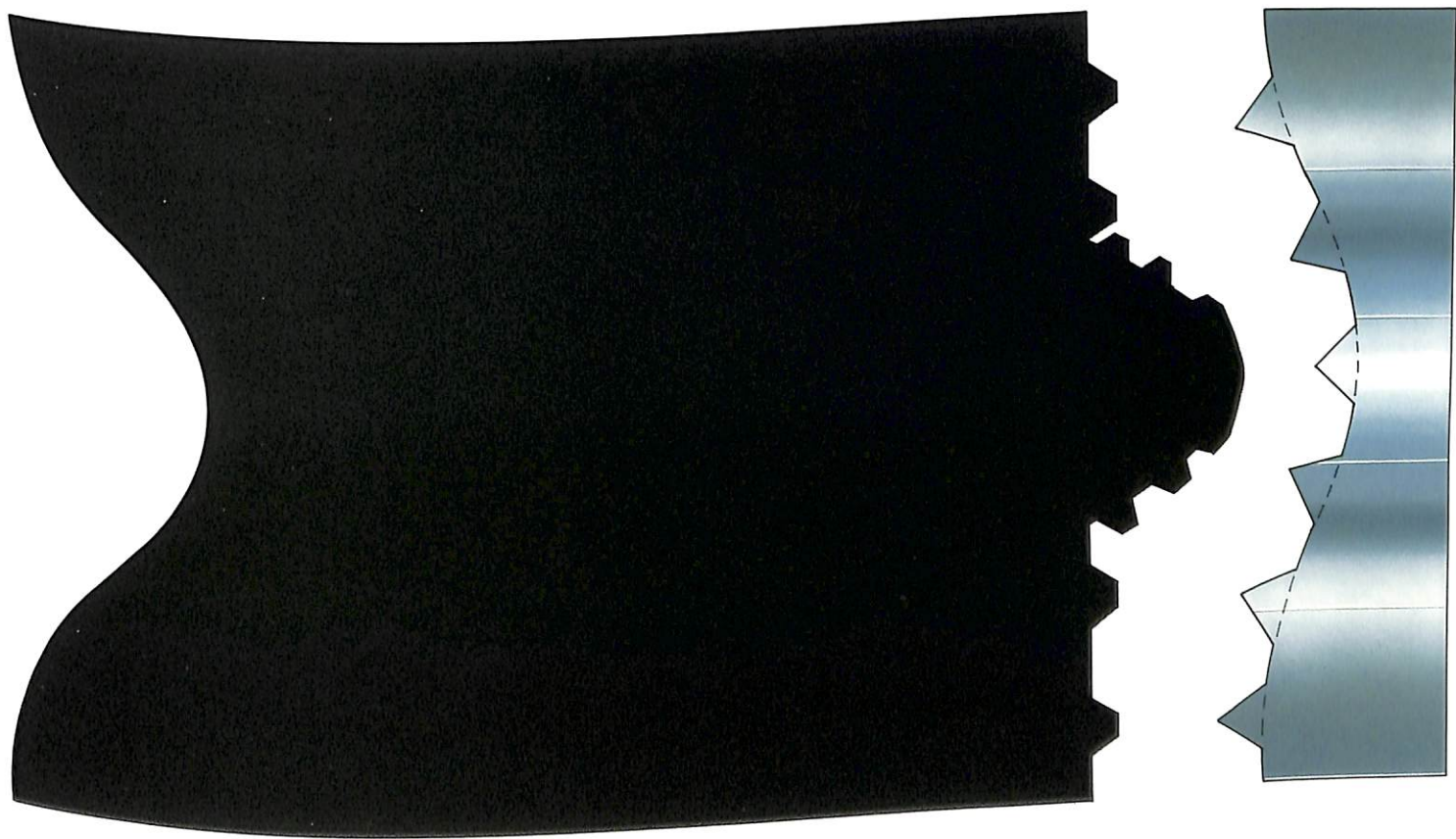
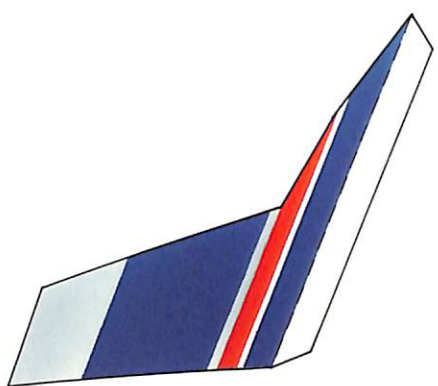
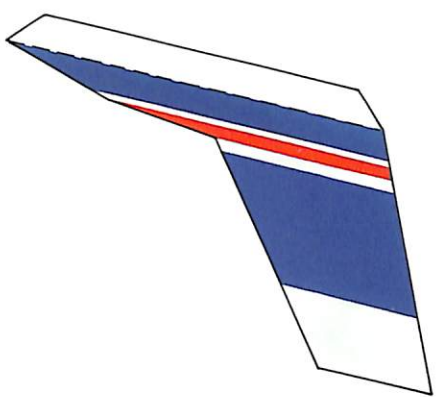


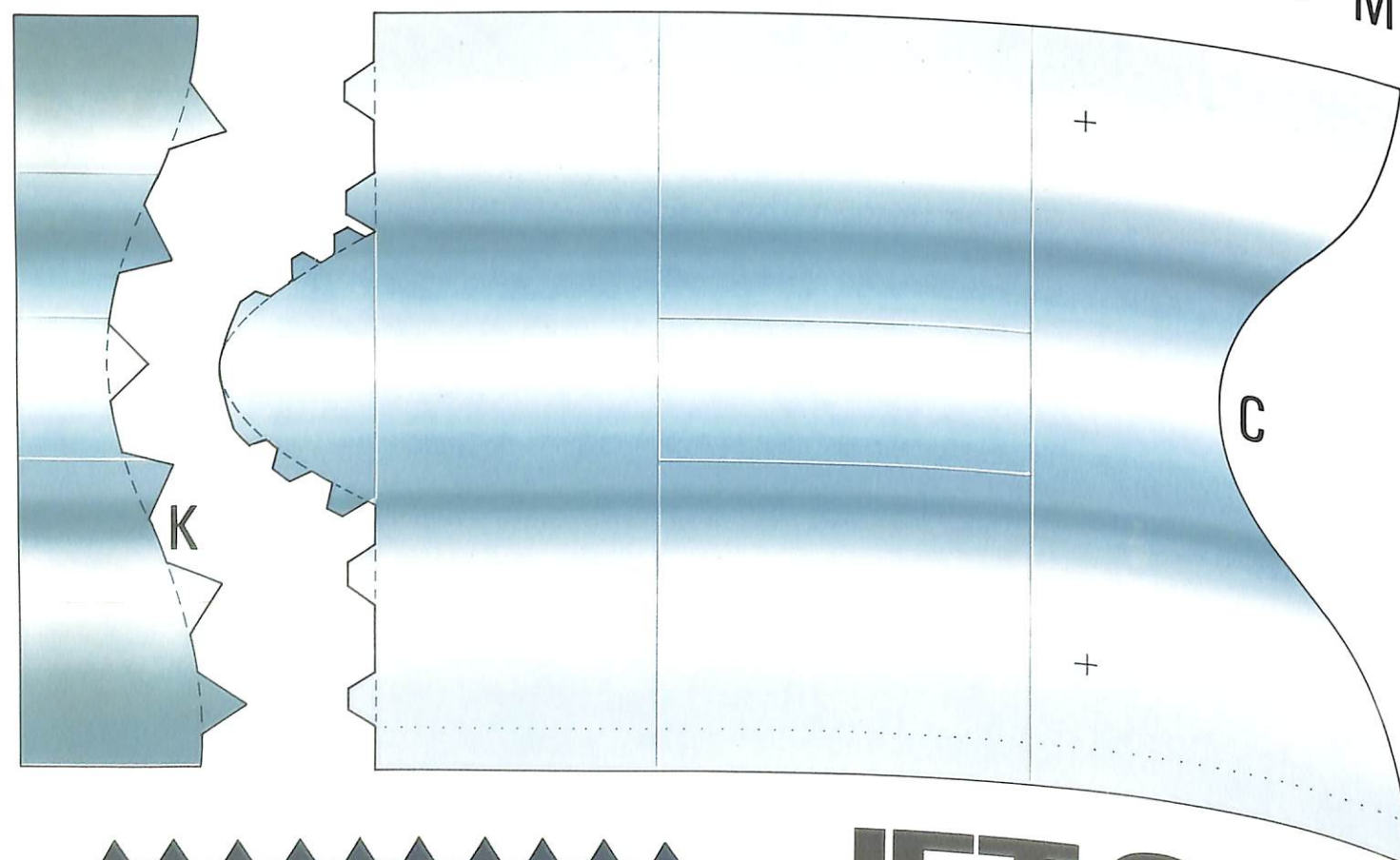
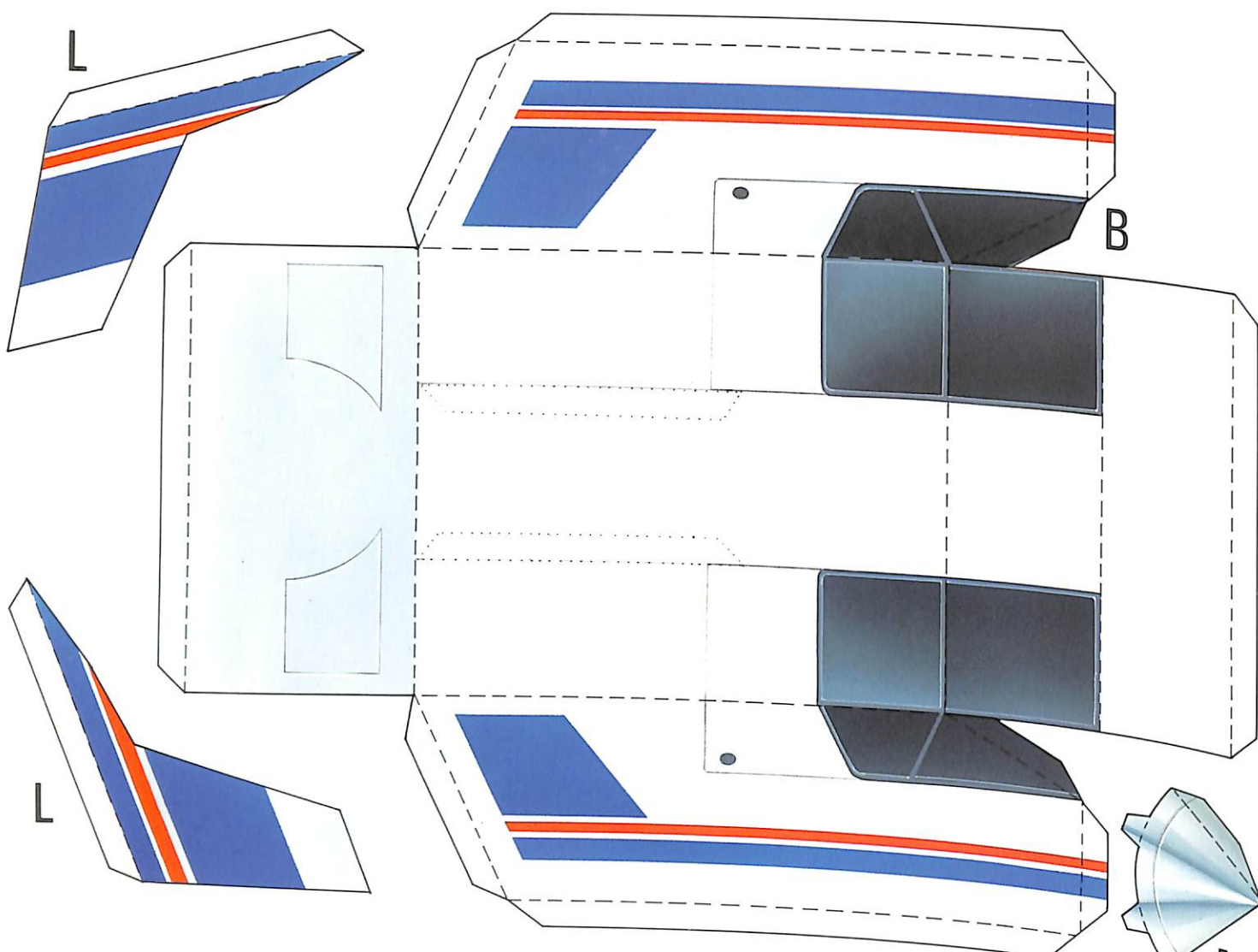
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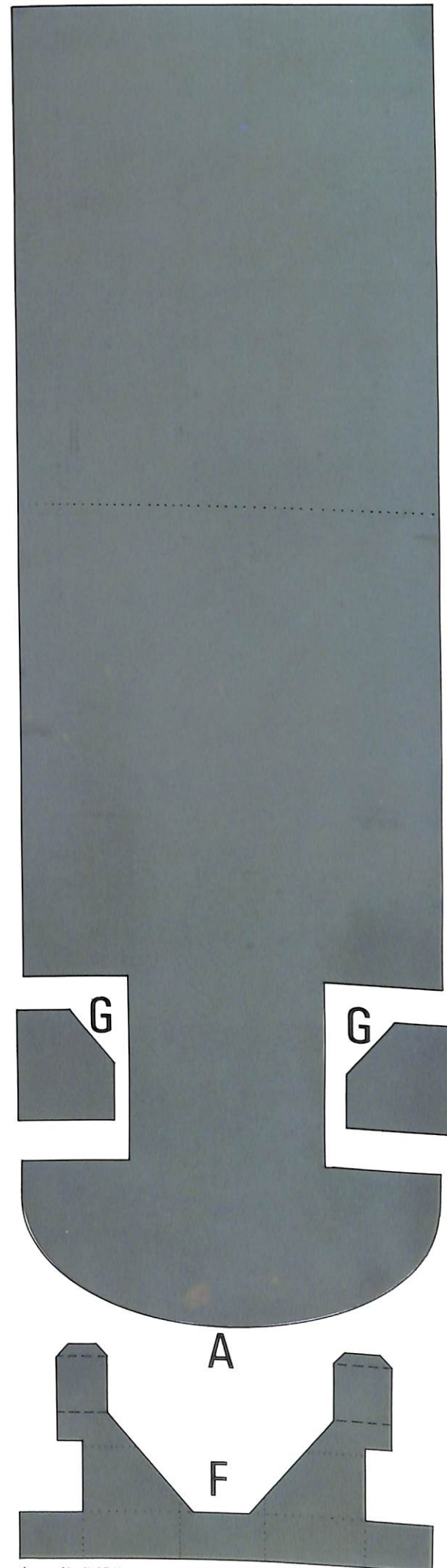
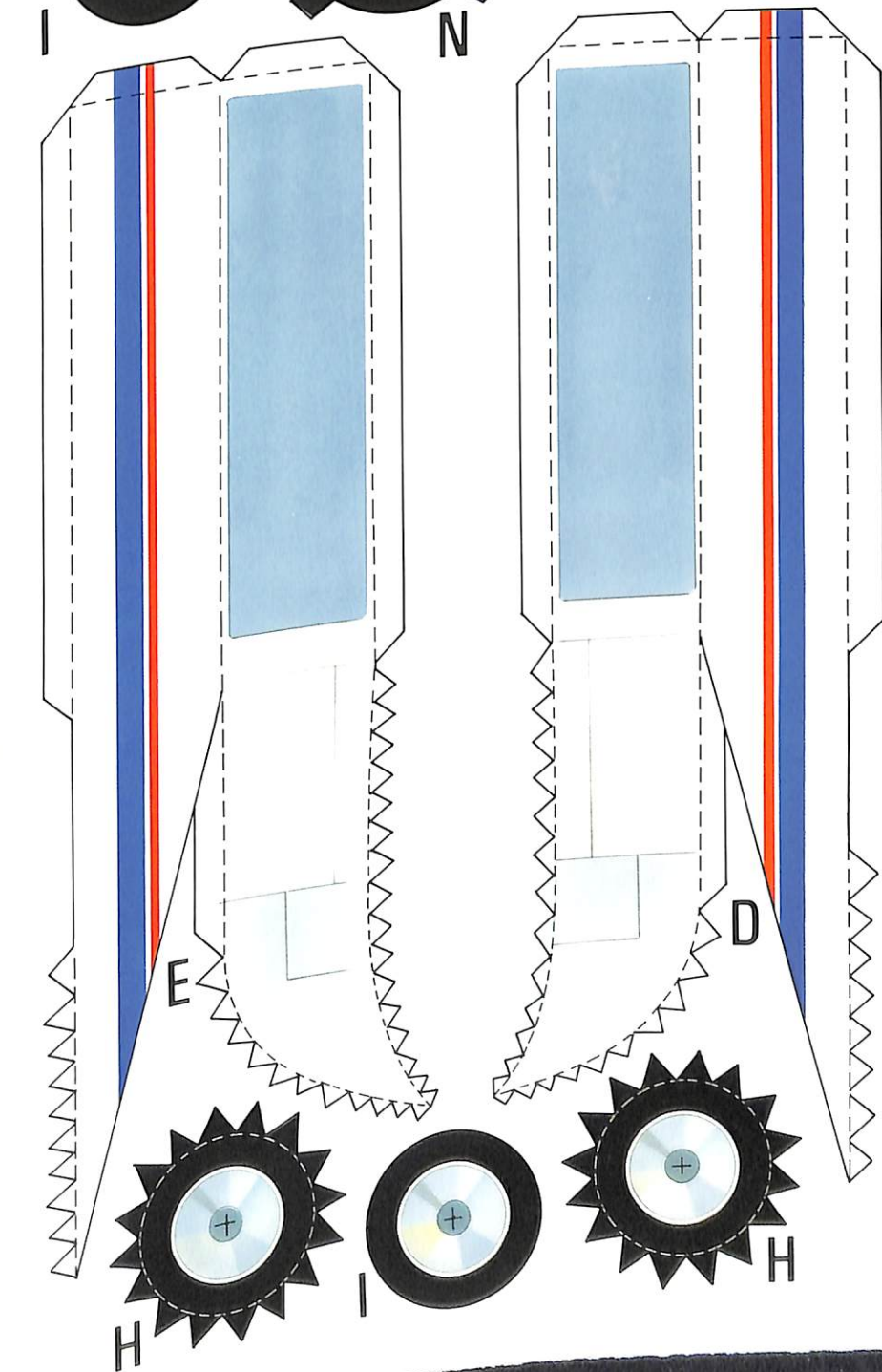
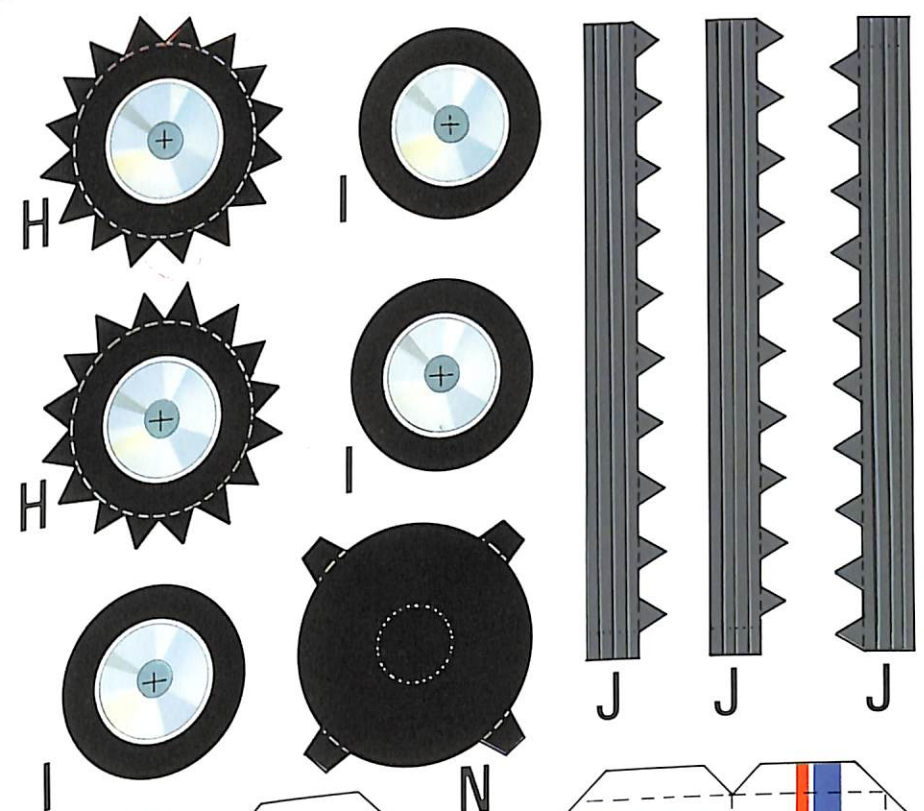
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JET CAR

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James Nevill 3D/Stam North

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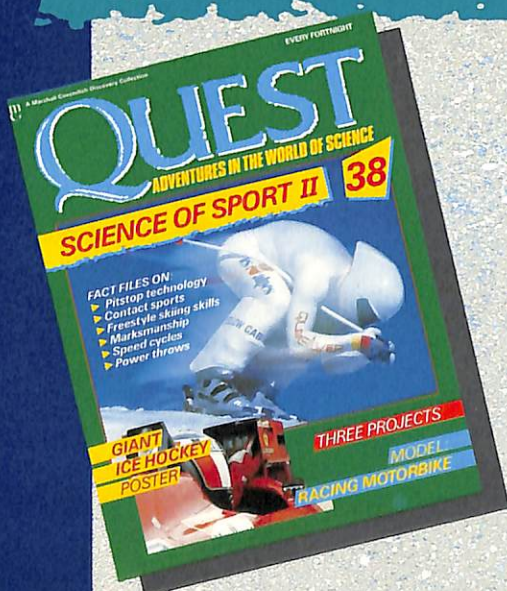
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